



Multi-Modal Traveler Information System

*VMS/HAR
State-of-the-Practice
Working Paper # 19840.00*

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

1.1.1 GCM Overview

The Gary-Chicago-Milwaukee (GCM) Corridor is one of the four "Priority Corridors" established by the United States Congress in the Inter-Modal Surface Transportation Efficiency Act (ISTEA). These corridors have been selected for special federal transportation funding based on very specific transportation and environmental criteria. The GCM Corridor is broadly identified by 16 counties in the states of Wisconsin, Illinois, and Indiana. It includes all major freeways, expressways, major arterials, airports, transit, and rail systems, ports and intermodal transfer stations. The Corridor extends 130 miles and covers more than 2,500 square miles, is home to more than ten million people and employs more than four million persons. Representatives from state, regional and local agencies and private firms, including tollways, public transit, departments of transportation, service providers and metropolitan planning organizations, actively participate in corridor activities.

The goals and objectives of the GCM Corridor are as follows:

- Create a state-of-the-art corridor;
- Improve productivity;
- Improve safety;
- Reduce energy use and other negative environmental impacts;
- Increase efficiency;
- Facilitate the sharing of information between both private firms and public agencies involved in the transportation of goods, materials and people in the GCM Corridor;
- Assist in the improvement of transportation flows in the GCM Corridor;
- Assist in the expansion of multi-modal transportation flows;
- Make transportation related information available to both operators and users of the information through local ITS centers;
- Increase traveler mobility and reduce travel times and costs by making real time information available to interested parties;
- Expand to meet the growth of transportation needs within the Corridor, with the ability to be modified to meet changing operational strategies; and
- Be compatible with other ITS implementation efforts within the Corridor that are consistent with the Corridor Program Plan.

The GCM Corridor offers the opportunity to support USDOT Intelligent Transportation System (ITS) operational tests and to provide a test bed for long-term research and evaluation of ITS. As part of the effort, a twenty-year Corridor Program Plan has been developed. This plan outlines a vision for ITS applications and the creation of a state-of-the-art test bed. It also defines the roles of the participants. For the GCM Corridor, ten program areas were established to address a common set of program objectives. The Multi-Modal Traveler Information System (MMTIS) is the first of these program areas.

1.1.2 Multi-Modal Traveler Information System (MMTIS) Overview

The MMTIS project revolves around the concept of a GCM Corridor traveler information system. It involves research into the areas of Intelligent Transportation Systems in the Corridor that are currently deployed, and proposed systems identified in regional strategic plans or early deployment studies. This information is used to develop a corridor architecture which best suits the characteristics of the diverse resources within the Corridor. Along with the Corridor architecture, a corridor strategic plan will be developed. Another key component of the MMTIS project is the design of the Gateway Traveler Information System. The Gateway will be the collection and distribution hub for traveler information in the GCM Corridor. Specific tasks identified in the MMTIS project include developing the following documents for the Gateway: *System Definition Document, Requirements Specification, and Interface Control Specification.*

1.1.3 Role of a Coordinated Policy for the use of VMS/HAR

Principle components of information dissemination system devices that are currently employed within the Corridor are Variable Message Signs (VMS) and Highway Advisory Radio (HAR). Variable Message Signs (VMS) are also commonly referred to as “Changeable Message Signs (CMS)” in some areas of the country. For purposes of this paper, the terms are considered to be synonymous. Currently, there are five agencies that operate and maintain Variable Message Signs and Highway Advisory Radio (VMS/HAR) in the Corridor. These agencies are:

- the City of Chicago - Bureau of Traffic.
- the Illinois Department of Transportation;
- the Illinois State Toll Highway Authority;
- the Indiana Department of Transportation; and
- the Wisconsin Department of Transportation;

Each of the above agencies currently operate VMS/HAR devices independently of one another. Besides the lack of coordination between these agencies in disseminating information to motorists, there is also a lack of consistency in usage across a wide range of issues including the types of events the devices are used for, abbreviations employed, target audiences, and the language used to describe locations, incidents, actions, or routes. A coordinated policy for the use of VMS/HAR within the Corridor would build a foundation upon which the operation of these devices can be made consistent among the five primary operating agencies.

1.2 PURPOSE

Each of the five agencies recognizes the need to consider a coordinated policy for the use of VMS/HAR devices throughout the Corridor. This policy will ultimately address all technical and institutional issues that can be identified and are relevant to the development of a coordinated policy in the Corridor. It is also anticipated that the policy should address the integrated use of VMS/HAR to disseminate information to motorists such that the devices can be integrated through the combined development of, not only, a coordinated policy that addresses institutional issues, but a policy that also addresses technical integration issues consistent with the Corridor-wide system architecture. As such, the relevant

issues associated with the development of a coordinated policy for the use of VMS/HAR in the Corridor can be categorized into two major areas: institutional issues, such as, message structure and sign usage; and technical issues, such as, integration of the devices and design issues related to device location, specifications, etc. These two areas cannot be fully separated from one another.

1.2.1 Goals of this Working Paper

This Working Paper will document local agency input relevant to the potential development of a uniform policy to ensure coordinated and consistent use and operation of Variable Message Signs and Highway Advisory Radio throughout the Gary-Chicago-Milwaukee Corridor. The contents herein, ideas presented and recommendations are made to stimulate discussion, with the intent of developing a coordinated policy that can be used to establish guidelines upon which each operating agency can develop design, operation and maintenance standards.

1.2.2 Intended Audience

This Working Paper is intended to serve as a resource and a guide to the five operating agencies identified in Section 1.1.3.

1.2.3 Goals and Objectives of the Coordinated VMS/HAR Policy

A coordinated VMS/HAR policy would identify common grounds of operational practices between the five operating agencies identified in Section 1.1.3 such that the information broadcast to motorists is meaningful, consistent, timely, accurate and credible. Where common ground can not be resolved, the policy should establish a consistent range of allowable deviation that is acceptable to each agency. In order for the policy to gain acceptance as well as be a useful tool toward the development of standards and specifications for these devices, the policy should be devised so that it can be employed within an integrated Corridor-wide system or within independent systems. Regardless of the level of implementation, the policy should facilitate the meaningful, consistent, timely, accurate and credible dissemination of information to the motoring public within the Corridor.

1.2.4 Working Paper Organization

This Working Paper is organized to present the technical issues relevant to the development of a coordinated VMS/HAR policy within the Corridor. Section 2 identifies the methodology employed to conduct a survey of agencies within the Corridor as well as agencies across North America that actively operate and maintain VMS/HAR system devices. Section 3 summarizes the “State-of-the-practice” of each of the agencies surveyed including the GCM Corridor agencies (*Information relevant to the existing operational practices of the Illinois State Toll Highway Authority has not been made available as of the date of this initial draft Working Paper*). Finally, Section 4, discusses the activities that will take place over the next several months to assist the Corridor agencies in considering and developing a coordinated VMS/HAR policy.

1.3 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Document #17100-1, MMTIS Project Glossary, contains all definitions, acronyms, and abbreviations associated with this project, as well as ITS, communications, computer programming, and other standards in general. The following terms are used extensively throughout this paper and are defined below:

- **Active Message:** Messages that state the event and location, and also direct the motorist to take a specific action, such as, "INCIDENT AHEAD, 2 MILES, EXIT ON MONROE"
- **CMS:** Changeable Message Signs (CMS) are signs that can be permanently mounted over an expressway/arterial or temporarily placed along side the roadway that can display dynamic messages issued from a central site or installed locally at the sign location. (Synonymous with VMS)
- **Fixed Message Sign:** A message board that has the capability to display a maximum of two messages. Also referred to as a "Binary" sign. These types of signs are *not* discussed in this working paper and are not to be confused with the terms CMS or VMS.
- **HAR:** Highway Advisory Radio
- **Message Phasing:** All or a portion of a VMS message board that can be programmed to display two or more separate messages by sequencing or scrolling the text.
- **Passive Message:** Messages that state the event and location, but do not specifically state any action the driver should take to avoid the event, such as, as "INCIDENT AHEAD, 2 MILES, USE CAUTION".
- **TMS:** Traffic/Transportation Management System
- **TOC:** Traffic/Transportation Operations Center
- **VMS:** Synonymous with CMS

1.4 RELATED DOCUMENTS

This Working Paper is part of a series of documents and Working Papers produced to support the design of the GCM Corridor Multi-Modal Traveler Information System. Related documents and Working Papers include:

- Document #17100-1 - MMTIS Project Glossary
- Document #17150 - Gateway TIS System Definition Document
- Document #17200 - GCM Corridor Architecture Requirements Specification
- Document #17250 - Gateway TIS Requirements Specification
- Document #17300 - GCM Corridor Architecture Interface Control Specifications
- Document #17350 - Gateway TIS Interface Control Specifications
- Working Paper #18250 - Cellular 911 - State of the Practice
- Working Paper #18380 - GCM Corridor User Needs and Data Exchange Requirements
- Working Paper #18400 - Regional Strategic Plans
- Working Paper #18500 - GCM Corridor Strategic Plan
- Working Paper #18520 - Performance Criteria for Evaluating GCM Corridor Strategies and Technologies
- Working Paper #18550 - Alternative GCM Corridor Technologies and Strategies
- Working Paper #18600 - System Interfaces and Information Exchange

- Working Paper #18700 - Information Clearinghouse - Initial Administrative Network
- Working Paper #18790 - Information Clearinghouse - Final Network
- Working Paper #18830 - Weather Detection System Standard Message Sets
- Working Paper #19140 - Gateway TIS Phased Implementation Plan
- Working Paper #19210 - Lessons Learned
- Working Paper #19220 - Gateway TIS Design Options

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2. METHODOLOGY

2.1 DATA COLLECTION PROCEDURES

The data collection process consisted of the distribution of a detailed questionnaire (included in the Appendix) to agencies that operate and maintain VMS/HAR within the Corridor as well as agencies identified from across North America that would be able to provide valuable insight to the development of a coordinated policy. In a few cases, the person being contacted delegated or referred the questionnaire to a corresponding agency who would be better suited to respond. If no response was received, each agency was contacted by phone to determine if there were any problems or concerns with the questionnaire. In the case of the local GCM Corridor Agencies, a second follow-up call was placed one to two weeks after the initial call as necessary. To date, the Illinois State Toll Highway Authority has not responded to the questionnaire. The City of Chicago responded verbally, and the City of Milwaukee indicated that they did not operate VMS or HAR and would have no input to the questionnaire. All other agencies within the Corridor have responded to the questionnaire.

A workshop was then held with the Corridor agencies on March 13, 1997. The workshop aimed to discuss the similarities and differences in operation of VMS/HAR between each responding agency and to facilitate an understanding to proceed with the development of a coordinated policy. Several issues were briefly discussed during the workshop and are documented in the meeting minutes, which have been forwarded to each participating agency. The responses to the questionnaire and the issues discussed during the workshop are compiled and summarized in Section 3.

2.2 AGENCIES CONTACTED

A list of agencies and the principle contact points that were mailed a questionnaire is presented in Table 2-1. In some cases, the original contact delegated the required response to a staff member who completed the questionnaire, or referred the questionnaire to another agency that was better able to respond.

Table 2-1: Agency and Contact List

Agency	Contact/ Delegated to...	Phone No.	Referral
GCM Corridor Agencies			
Chicago DOT	Thomas Smith/ John Ellis	(312) 744-4608	
<i>Illinois DOT</i>	<i>Joseph McDermott</i>	<i>(847) 705-4141</i>	
Illinois DOT	Larry Bradley	(847) 705-4441	
Illinois DOT	Joseph Ligas	(847) 705-4800	
Illinois DOT	Tony Cioffi	(708) 524-2145	
Illinois State Toll Highway Authority	Neal MacDonald	(630) 241-6800	
<i>Indiana DOT</i>	<i>Dan Shamo</i>	<i>(317) 232-5523</i>	
<i>Indiana DOT</i>	<i>Delmae Heinlein</i>	<i>(219) 325-7412</i>	
Milwaukee DOT	Mariano Schifalacqua	(414) 286-2400	
<i>Wisconsin DOT</i>	<i>Phil DeCabooter</i>	<i>(608) 267-0452</i>	

Table 2-1: Agency and Contact List (Continued)

Agency	Contact/ Delegated to...	Phone No.	Referral
<i>Wisconsin DOT</i>	<i>Steve Young/ Dave Petchel Don Schell Julie Brooks</i>	<i>(414) 227-2160 (414) 227-2157 (414) 227-2148 (414) 227-2161</i>	
Wisconsin DOT	John Corbin	(414) 227-2150	
Outside Agencies			
Anaheim, City of	John Lower	(714) 254-5183	
CALTRANS	George Smith	(916) 654-9849	
<i>Colorado DOT</i>	<i>Larry Corcoran</i>	<i>(303) 239-5807</i>	
<i>Connecticut DOT</i>	<i>William Stoeckert</i>	<i>(860) 594-2630</i>	
Denver Regional Council of Governments	Steve Rudy	(303) 480-6747	Colorado DOT
Georgia DOT	Joe Stapleton	(404) 656-5423	
Houston, City of	Doug Wiersig	(713) 613-0308	
I-95 Corridor	Michael Eadicicco		
<i>INFORM</i>	<i>Joe Contegni</i>	<i>(516) 952-6781</i>	
<i>Kentucky DOT</i>	<i>Leon Walden</i>	<i>(502) 564-7433</i>	
Massachusetts DOT	Daniel Beagan		
<i>Michigan DOT</i>	<i>Kunwar Rajendra/ Ray Klucens</i>	<i>(313) 256-9800</i>	
<i>Ministry of Transportation, Ontario</i>	<i>Gabriel Heti/ Philip Masters</i>	<i>(416) 235-3798</i>	
<i>Minnesota DOT</i>	<i>James Wright/ Patty Bednarz</i>	<i>(612) 341-7276</i>	
<i>Ohio DOT</i>	<i>Robert Yankovich</i>	<i>(614) 466-3601</i>	
Oregon DOT	Milan Kenkar	(503) 986-3489	
Orlando, Florida	Harry Campbell	(407) 246-3255	
Orlando, Florida	Robert Gottschalk		
Phoenix, City of	Grote Wolf	(602) 262-4619	
Portland, City of	William Kloos	(508) 823-5382	
<i>San Antonio, City of</i>	<i>John German/ Ling Yu</i>	<i>(210) 733-4574</i>	
Transcom	Matthew Edelman	(201) 963-4033	
<i>Virginia DOT VDOT VDOT Arlington TMS VDOT Suffolk TMS Virginia DOT TOC (HAR Only)</i>	<i>Jim Robinson/ Robb Alexander Jimmy Chu Stephany Hanshaw Ronald Miner</i>	<i>(804) 371-2970 (703) 383-2600 (757) 424-9907 (703) 383-2003</i>	
<i>Washington DC</i>	<i>Peter Moreland</i>	<i>(202) 939-8089</i>	
<i>Washington DOT</i>	<i>Peter Briglia/ Bill Legg</i>	<i>(206) 543-3332</i>	

Note: Participating agencies and contacts who responded to the questionnaire are in italics.

3. SUMMARY OF PRACTICES

As noted in Table 2-1, several agencies responded to the questionnaire. Section 3.1 summarizes the responses provided by agencies outside the GCM Corridor from across North America. Next, the responses to the questionnaires from agencies located within the GCM Corridor as well as insight into existing operational practices gained from the workshop discussion are presented and summarized in Section 3.2. Similarities in the VMS/HAR operating practices of the GCM Corridor agencies are discussed in Section 3.3 and provide the beginning foundation for the common ground to build the VMS/HAR coordinated policy. The principle operational differences are discussed in Section 3.4, which is formatted to easily identify the work that the VMS/HAR Task Force will address in the coming months.

3.1 STATE-OF-THE-PRACTICE OF AGENCIES ACCROSS NORTH AMERICA

Several agencies from across North America responded to the questionnaire and provided valuable insight into the operational practices employed to meet specific needs. Further, several of these agencies provided documentation relative to message structures, adopted policies and standards that will serve as a guide to work conducted for the GCM Corridor. Points of particular interest from each agency are summarized below. A detailed summary of each agency's responses is provided in Table 3-1 and 3-2.

3.1.1 Colorado DOT - Larry Corcoran

The Colorado DOT (CDOT) uses both permanent and portable VMS. Five old VMSs on I-70 west of Denver have recently been upgraded to flip fiber. In addition, five new LED signs are currently being installed and four additional fiber signs are currently out for bid. CDOT has plans to install 40 to 50 small precision solar powered signs in permanent locations. The state is very active in the use of VMS to disseminate information to motorists and plans are currently underway across the state to move toward permanent VMS installation. All CDOT regions have plans to install additional permanent VMSs.

Currently, the CDOT TOC operates all permanent VMSs for some regions at all times of day. Other region's VMSs are operated by the TOC only at night and are operated by the particular region staff during the day. Some regions choose to operate their VMSs without any assistance from the TOC.

CDOT uses the VMSs to display incident related information that impacts traffic. No information relative to construction, maintenance or weather is provided. Congestion management messages are used.

CDOT uses passive and active diversion messages. Viable diversion routes include highways and major arterials. The local jurisdictions are used to evaluate and monitor the diversion route.

CDOT chooses not to display non-traffic messages except during July 4 and Labor day when drunk driving program messages are used. CDOT prefers to leave the signs blank when not otherwise utilized.

Three message phases are permitted per sign and are applied to the entire sign. Each phase is displayed for 1.5 to 2 seconds.

Event locations are identified by both landmarks and mileage references.

CDOT currently uses HAR and has plans to expand the existing system. HAR broadcasts are manually coordinated between CDOT and the City of Denver.

3.1.2 Connecticut DOT - William Stoeckert

Connecticut DOT (ConnDOT) uses both permanent and portable VMS and is currently studying expansion of their VMS coverage to I-91 and I-84. A user manual was developed through a multi-agency Task Group and the combined practice and experiences of operational staff. This manual includes reference to the operational guidelines and practices which have been modeled after the I-95 Corridor Coalition effort.

ConnDOT uses passive and active diversion messages. Viable diversion routes include highways and major arterials. Active Diversion is used only for freeway closures and verified severe incidents. Static signing is installed on diversion routes in advance of the diversion and the local enforcement agency is notified. The diversion route is evaluated from system detection upstream of the closure and the status is verified through CCTV, detection devices, law enforcement agencies and DOT maintenance crews.

ConnDOT chooses not to display non-traffic messages and prefers to leave the signs blank when not otherwise utilized.

Two message phases are permitted per sign and are applied to the third line only of a three line sign. LED signs phase for two seconds and flip cube signs phase for three seconds.

Event locations are identified by landmarks such as exits and towns.

ConnDOT is currently planning to add HAR coverage. There are currently two HAR transmitters in place that broadcast ride share information. These transmitters are being considered, as well as installation of others, to provide traffic management data to motorists.

3.1.3 INFORM (Long Island, New York) - Joe Contegni

INFORM uses both permanent and portable VMS and is currently in the process of expanding the system along 20 miles of the Southern State Parkway. This expansion includes the addition of 18 VMSs. Operational guidelines are documented and are available from INFORM.

INFORM uses passive and active diversion messages. Viable diversion routes include highways and major arterials. Active Diversion is used for freeway closures, verified severe incidents and where improved travel times can be confirmed along the identified diversion route.

The INFORM operational practices allow for the display of non-traffic messages which include safety messages as well as other transportation related messages. Signs are not left blank.

Permanent VMS messages can be selected either automatically from a pre-defined library based on traffic condition or can be generated manually by the operators as conditions warrant.

Two message phases are permitted per sign and can be applied to the entire sign or only the third line. Each phase is displayed for three seconds.

Event locations are identified by exit number. It is noted that New York exits are identified by a consecutive numbering system rather than mile posts.

INFORM is currently planning to add HAR coverage.

3.1.4 Kentucky DOT - Leon Walden

The Kentucky Transportation Cabinet (KYTC) uses both permanent and portable VMS. The permanent signs are currently being considered as part of the Louisville Incident Management Program which is in the design stage. Signs are used to disseminate information relevant to severe or moderate incidents and accidents. All messages must first be approved by a supervisor before being sent to the field. All signs “call back” before accepting a message from the operations center to verify the correct receipt of the message.

KYTC does not use active diversion messages.

KYTC chooses not to display non-traffic messages and prefers to leave the signs blank when not otherwise utilized.

Permanent and portable VMS messages can be selected from a variety of different sources and techniques including expert systems, manual selection from a pre-defined library, automatically selected from a library based on traffic conditions or manually generated by an operator as conditions warrant.

Three message phases are permitted per sign and are applied to the entire sign.

Event locations are identified by mileage references.

KYTC currently uses HAR and plans to extend the system to cover a slightly larger area than the extent of the VMS system.

3.1.5 Michigan DOT - Ray Klucens

The Michigan DOT (MDOT) uses permanent VMS and have plans to install 43 fiber optic/flip disk signs along 148 miles of freeway in metropolitan Detroit. Operational guidelines are in the process of being approved and have not yet been distributed.

MDOT uses both passive and active diversion messages. Viable diversion routes include only freeways that are under system control and where surveillance data is available.

MDOT chooses not to display non-traffic messages. However, signs are not left blank when not otherwise utilized. MDOT programs a “star” to scroll across the message board to advise motorist the signs are operational.

Three message phases are permitted per sign and can be applied to portions of the sign or only the third line. Each phase is displayed for eight seconds.

Event locations are identified by landmarks such as exits and bridges.

MDOT is currently planning to add HAR coverage.

3.1.6 Ministry of Transportation, Ontario - Philip Masters

The Ministry of Transportation, Ontario (MTO) uses both permanent and portable VMS. MTO will continue to expand the system and install additional VMSs to manage traffic on the network of freeways in metropolitan Toronto. MTO is considering using graphic-capable signs as opposed to text only signs. The portable signs are controlled by data radio links from the Control Center.

Congestion management messages are fully automated and are based on data received from the count stations which are spaced for automated incident detection purposes. MTO operations staff continually “fine tune” the system as required based on observations and public reports.

MTO uses passive and active diversion messages. Viable diversion routes include highways and major arterials. Active diversion is used for freeway closures only.

MTO operational practices allow for the display of non-traffic messages which include safety messages as well as other transportation efficiency messages such as the provision of transit information. Signs are not left blank.

Permanent VMS messages are selected automatically from a pre-defined library based on traffic conditions. Message templates are populated with relevant traffic, location and condition data as necessary. Portable VMS messages are manually selected by the operator.

Two message phases are permitted per sign, but are very rarely used. The message phase can be applied to one line for emphasis. Each phase is displayed for approximately three seconds.

Event locations are identified by landmarks.

MTO is currently planning to add HAR coverage but are also considering installation of Dedicated Short-Range Communications (DSRC) or digital radio in place of traditional HAR devices.

3.1.7 Minnesota DOT - Patty Bednarz

The Minnesota DOT (MnDOT) uses both permanent and portable VMS. MnDOT has plans to install additional VMSs as the traffic management systems is expanded throughout the Minneapolis metropolitan area. MnDOT has stated their basic VMS policy as follows:

“It is the policy that changeable message signs (CMSs) will be used (where available) in the event of an incident or other situation (construction, special events, etc.) that affects freeway traffic flow to alert motorists of unexpected circumstances”.

MnDOT does not use active diversion messages.

MnDOT chooses not to display non-traffic messages. Signs are left blank when not otherwise utilized.

Permanent VMS messages are selected automatically from a pre-defined library based on traffic conditions. Message templates are populated with relevant traffic, location and condition data as necessary. Portable VMS messages are manually selected by the operator.

Message phases are not permitted.

Event locations are identified by landmarks.

The MnDOT traffic management system does not currently use HAR and has no plans to add HAR broadcasts to the system. However, MnDOT construction crews use portable HAR transmitters during construction. The HAR is included as part of the construction contracts. The traffic management system has formed a partnership with an FM radio station to broadcast traffic information during peak periods.

3.1.8 Ohio DOT - Robert Yankovich

The Ohio Department of Transportation (ODOT) uses both permanent and portable VMS. VMSs will be included in most of the future urban freeway management system installations in the State of Ohio. ODOT is currently developing VMS procedures for use with rural work zone traffic control.

ODOT does not use active diversion messages.

ODOT chooses not to display non-traffic messages. Signs are left blank when not otherwise utilized.

Message phases are permitted.

Event locations are identified by both landmarks and mileage references.

ODOT currently uses HAR and plans to extend the system to cover a slightly larger area than the extent of the instrumented network, to capture in-bound traffic.

3.1.9 San Antonio, City of - Ling Yu

The City of San Antonio does not currently utilize permanent or portable VMS. The City does plan to include VMS within their system in the near future and are currently studying the relevant issues. Freeway diversions onto City streets have been identified as a primary reason for installing signs within the City. The City does not feel that congestion management messages will be employed.

The City will not display non-traffic messages. Signs will be left blank when not otherwise utilized.

It is anticipated that messages will be automatically selected from a pre-defined library based on the traffic conditions.

The City currently does not use HAR but has plans to install these devices. Unlike the VMS system, the City anticipates using HAR to disseminate active diversion messages. The HAR will be coordinated with the TransGuide Operations Center. TransGuide is an operational ATMS system in San Antonio, Texas.

3.1.10 Virginia DOT

The Virginia DOT (VDOT) uses permanent and portable VMS and have plans to develop a statewide network of coordinated VMS and HAR devices. The network will add an additional 75 VMSs throughout the State and outside of the existing traffic management system coverage areas. The new signs will be located in rural interstate locations which are considered key to statewide incident management. Each of the new signs will have remote telephone dial-up connection. The overall status of the signs will be automatically updated on the wide area network, known as the Virginia Operations Information System (VOIS). In addition, existing rotating drum signs will be replaced in the Suffolk District. LED signs will be installed in the Arlington District as possible and will have walk-in enclosures for easy maintenance.

VDOT uses passive and active diversion messages. Viable diversion routes include highways and major arterials. Active diversion is used for freeway closures and verified severe incidents. The local jurisdictions are used to evaluate and monitor the diversion route.

The Suffolk TMS does not display non-traffic messages. Signs are left blank when not otherwise utilized. The Arlington TMS displays upcoming special events and time and date. Signs controlled by the Arlington TMS are not left blank.

Messages are manually selected from a pre-defined library or can be manually generated as conditions warrant at the Suffolk TMS. The Arlington TMS has similar capabilities, but also responded that messages can be automatically selected from a pre-defined library as conditions warrant.

The Arlington TMS allows up to three message phases per sign that can be applied to portions of the sign or only one line. Each phase is displayed for approximately 2.5 seconds.

Event locations are identified by mileage references at the Suffolk TMS, and by both landmarks and mileage references at the Arlington TMS.

VDOT is currently using HAR and has plans to add an additional 25 transmitters at major detour/diversion route decision points. The Suffolk TMS does not allow other agencies direct access to their transmitters and indicated that they do not coordinate transmissions with any other agency. A TOC allows the Fairfax County Police Department to have access to the HAR transmitters. The Police obtained the FCC license for the transmitter and VDOT purchased the equipment in this case. Some access is permitted to tourism agencies, but the department has the ability to override any current message with any emergency information.

3.1.11 Washington DC - Peter Moreland

Washington DC currently uses permanent VMS and will expand the existing system as necessary. Currently, HAR is not used, but there are plans to include these devices in future work in the City.

3.1.12 Washington DOT - Bill Legg

The Washington DOT (WSDOT) uses both permanent and portable VMS. Current plans call for VMSs to be located at all major decision points (interchanges) on the highway network in the greater Seattle area. VMS expansion is also planned in Spokane, Vancouver, and the Tacoma/Olympia areas. WSDOT is divided into six separate regions, four of which currently have VMSs. Each region operates their VMSs based on their identified needs. There are no statewide agency guidelines. WSDOT responded that if a statewide guideline were to exist, it would have to vary from region to region. The responses received were for the Seattle Region.

The Seattle Region does not use VMSs to disseminate congestion management information. Special events that are expected to have a significant impact on traffic are displayed.

The Seattle Region uses passive and active diversion messages. Viable diversion routes include freeways only and are used for freeway closures and verified severe incidents only.

The Seattle Region will rarely display a safety related non-traffic message on the VMSs. Signs are left blank when not otherwise utilized.

Three message phases are permitted per sign, but are very rarely used. The message phase is applied to the entire sign. The phases are displayed for various durations.

Event locations are identified by landmarks.

WSDOT allows the Washington State Patrol to have direct access to the signs in the Spokane, Olympia/Tacoma and Vancouver areas. The Seattle Region does not allow any other agency access to the VMSs.

WSDOT currently uses HAR and has plans in the Seattle Region to cover all major highway interchanges and areas affected by major weather events such as floods, avalanches, etc. The Washington State Patrol has direct access to the HAR transmitter in some regions, but not all. Typically HAR messages are not coordinated with other agencies except in some special cases that may involve major construction projects.

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Table 3-1: Outside Agencies - VMS Questionnaire Summary

Table 3-2: Outside Agencies - HAR Questionnaire Summary

3.2 STATE-OF-THE-PRACTICE OF GCM CORRIDOR AGENCIES

Four of five agencies that operate and maintain VMS/HAR devices within the GCM Corridor responded to the questionnaire. In addition to the questionnaires, the workshop conducted on March 13, 1997 also provided valuable insight into the operational practices employed by these agencies to meet specific needs. A detailed summary of each agency's responses from the questionnaire is provided in Tables 3-3 and 3-4. Points of particular interest from each agency are summarized below, including input from the March 13 workshop.

3.2.1 Chicago DOT - John Ellis

The City of Chicago operates 3 to 4 portable message boards which are used for special event traffic. Construction projects include a provision for the contractor to provide portable VMS to route traffic as necessary and specified in the bid documents. The Chicago Metropolitan Pier Exposition Authority (MPEA) currently operate one permanent VMS at Navy Pier. This sign is used to notify motorists of the current parking status. Currently, all messages must be installed manually in the field. The City believes that permanent VMS installations would be beneficial to transportation development and traffic management in the downtown core and other areas such as at Cicero Avenue and I-55.

3.2.2 Illinois DOT - Joseph McDermott

The Illinois DOT (IDOT) uses both permanent and portable VMS in the Chicago metropolitan area (IDOT District 1). Expansion plans call for a complete VMS system of 35 signs (20 are currently operational). The expansion will take place in a phased implementation process and work will be coordinated with major freeway roadwork projects.

IDOT does not use active diversion messages except for major freeway closures where any necessary improvements to pavement, signal systems, signing etc. can be accomplished on the diversion route in advance. Detection systems and personnel are in the field during the diversion to monitor the roadway performance as necessary.

IDOT chooses not to display non-traffic messages. Signs are left blank when not otherwise utilized.

Congestion messages are automatically selected for permanent signs from a pre-defined library based on traffic conditions. Incident messages are manually generated for permanent signs as conditions warrant. Portable sign messages are selected manually from a pre-defined library or can be manually generated for specific information or control needs.

Message phases are permitted as appropriate.

Event locations are identified by crossing arterial landmarks.

HAR is extensively used in northeast Illinois and there are plans to expand the existing system. HAR messages can be developed manually or automatically and travel times are updated every five minutes. IDOT also effectively utilizes several commercial radio stations to broadcast travel time information.

3.2.3 Illinois State Toll Highway Authority - Neal MacDonald

The Illinois State Toll Highway Authority (ISTHA) is currently reviewing their VMS policies. When the revisions are complete, ISTHA input will be added to this working paper.

3.2.4 Indiana DOT - Dan Shamo, Delmae Heinlein

The Indiana DOT (INDOT), LaPorte District, currently uses portable VMS and has plans to install 4 permanent VMSs in the Borman Expressway area within the next two years. All of the VMSs will be managed by the traveler information expert system which went on-line in March 1997. This system provides multiple user access as well as automatic message generation and group page notification to the media.

The INDOT Indianapolis District does not use active diversion messages. However, the LaPorte District will use active diversion for freeway closures.

The two districts will display non-traffic messages such as safety messages, HAR advisory messages and construction messages. The signs will not be left blank.

Messages are selected for both the permanent and portable VMSs in a number of different ways including: through an expert system, from a pre-defined library or manually generated as conditions warrant.

The Indianapolis District allows four message phases per sign. Each phase is displayed for a maximum of 1.2 seconds. The LaPorte District does not allow message phasing.

The Indianapolis District uses both landmarks and mileage references to identify event locations. The LaPorte District identifies event locations by mileage references only.

The two districts currently uses HAR and have plans to expand coverage in the near future. The HAR system is integrated into the traveler information expert system allowing messages to be developed automatically. Direct access to the HAR transmitters in the LaPorte District is provided to the Dunes National Lakeshore and Lake County Bureau of Tourism. Direct access in the Indianapolis District will be provided to the Columbus Area Visitor center and the Evansville Traffic Engineering Department.

3.2.5 City of Milwaukee - David Novak

The City of Milwaukee does not currently operate VMS/HAR devices, but have indicated a willingness to participate in the development of a coordinated policy to keep abreast of issues that may concern any future deployment.

3.2.6 Wisconsin DOT - Phil DeCabooter and Others

Wisconsin DOT submitted two separate questionnaires: one filled out by Phil DeCabooter and one filled out by three others (D. Petchel, D. Schell and J. Brooks; see Table 2-1). The two questionnaires, however, were very similar in the responses. Thus the summary information presented in Tables 3-3 and 3-4 is simply a combination of the two questionnaires. The following remarks highlight key points.

The Wisconsin DOT (WisDOT) uses both permanent and portable VMS. Expansion plans are anticipated and will be undertaken as required.

WisDOT does not use active diversion messages.

WisDOT will display non-traffic messages such as "Ozone Action Day", parking information for special events and other pertinent directional signing.

Messages for permanent sign installations can be manually selected, automatically selected from a pre-defined library based on traffic conditions, or manually generated as conditions warrant. Portable sign messages can be selected manually from a pre-defined library or generated manually.

Two message phases are permitted per sign. A message phase is applied to the entire sign. Each phase is displayed for 2.5 seconds. WisDOT uses a standard message structure by line.

Event locations are identified by landmarks.

Milwaukee County Maintenance currently has access to permanent VMSs. In the near future, the Milwaukee County Sheriff will have access as well. Milwaukee County Maintenance has a portable VMS that they deploy as appropriate. Contractors are sometimes required to provide and operate portable VMSs for construction projects.

WisDOT currently uses HAR and has plans to expand the system. WisDOT has access to the radio system used by the Milwaukee County Stadium and they are in the process of adding portable HAR units. No guidelines have been developed at this time.

3.3 SIMILARITIES IN OPERATING PRACTICES OF THE GCM CORRIDIOR AGENCIES

There are a number of similarities that can be identified among the GCM Corridor agencies that operate and maintain VMS/HAR in the region, which will provide an excellent starting point toward developing a coordinated policy. Perhaps most significant is the fact that each agency that attended the March 13, 1997 workshop and the Indiana Department of Transportation (unable to attend the Workshop) have stated a need to consider a Corridor wide policy such that standards can ultimately be developed that will present a uniform and consistent approach to the operation of VMS/HAR throughout the area.

A number of preliminary issues are identified in Section 4 of this working paper that will be reviewed, prioritized and resolved as much as possible in the coming months. It is anticipated that there are, perhaps, many more issues that will be identified through the course of developing a coordinated policy. The following are some of the common areas of practice, to varying degrees, among the Corridor agencies. The list provides an excellent starting point to begin working toward a coordinated policy.

- The information categories for display or broadcast messages
- General philosophy applied to the use of diversion messages
- Identification of event locations and stated desire to incorporate a wider audience
- Congestion information is disseminated in terms of travel time
- Similar messaging hierarchy giving incident management messages priority followed by congestion management information.

- Extensive use of portable VMS
- Similar communications requirements (dial-in to portable signs and existing or planned dedicated network to permanent signs)

3.4 DIFFERENCES IN OPERATING PRACTICES OF THE GCM CORRIDIOR AGENCIES

Juxtaposed with the similarities are several significant differences in operational practices and philosophies. Of course, not all of the differences are significant and may represent only a contrasting opinion. Nevertheless, these differences and others that will be identified through the course of developing a coordinated policy will be the most notable challenges that face the Task Force (discussed in Section 4.0) in developing a coordinated policy for the use of VMS and HAR in the GCM Corridor. The following list identifies a few of the areas where the operational practices currently differ as identified in the questionnaire or as revealed during the workshop.

- INDOT displays weather related information on their VMS.
- INDOT makes use of non-traffic oriented messages, WisDOT will occasionally display non-traffic messages and IDOT chooses to leave their signs blank. It is noted that the tollway also uses non-traffic messages.
- WisDOT modifies their messaging hierarchy during off-peak hours.
- WisDOT provides access to their VMS to outside agencies. INDOT and IDOT do not allow any other agency access to their VMS. However, INDOT does allow access to their HAR transmitters while WisDOT and IDOT do not.
- IDOT updates their HAR travel time messages every five minutes while WisDOT and INDOT update the HAR messages as events occur.
- IDOT broadcasts travel time information with HAR.
- Each agency detects and verifies incidents differently.
- Each agency uses different sign and HAR technologies.

Table 3-3: GCM Agencies - VMS Questionnaire Summary

Table 3-4: GCM Agencies - HAR Questionnaire Summary

4. PLAN OF ACTION TO DEVELOP A COORDINATED VMS/HAR POLICY

It was suggested during the workshop that a “VMS/HAR Task Force” be created to address and oversee the development of coordinated VMS/HAR policy. The objective of the Task Force would be to provide local agency input to the development of a policy to ensure coordinated and consistent use and operation of Variable Message Signs and Highway Advisory Radio throughout the Gary-Chicago-Milwaukee Corridor. The individuals assigned to the VMS/HAR Task Force will represent the position of each of the involved agencies. The Task Force will be made up of the following agencies and individuals:

- Chicago Department of Transportation - John Ellis
- Illinois Department of Transportation - Jeff Hochmuth and Tony Cioffi
- Illinois State Toll Highway Authority - John Benda (*pending final confirmation*)
- Indiana Department of Transportation - Delmae Heinlein
- Milwaukee Department of Transportation - Jeff Manthes
- Wisconsin Department of Transportation - Julie Brooks

The first Task Force meeting will be scheduled in May 1997 to review this working paper and identify a preliminary list of issues that will be addressed over the coming months. A preliminary list of issues is identified in Table 4-1. Each Task Force meeting will focus on a few of these issues at a time with the intent of reaching a common ground. Each issue will also be prioritized by the Task Force into one of the following categories:

- Priority 1 - Issues that the affected agencies identify as critical to their individual information dissemination needs, and require uniformity throughout the Corridor
- Priority 2 - Issues that the affected agencies identify as non-critical to their individual information dissemination needs, but require uniformity throughout the Corridor
- Priority 3 - Issues that the affected agencies identify as critical or non-critical to their individual information dissemination needs, but uniformity throughout the Corridor is not required.

Prior to each Task Force meeting, a detailed definition of each issue will be forwarded to each of the Task Force members. The definitions will also include a discussion of practices employed by various agencies across North America. This documentation is intended to provide the framework for each meeting such that the time spent is meaningful and productive.

Table 4-1: Preliminary List of Issues to be Addressed to Develop a Coordinated VMS/HAR Policy

ISSUE	COMMENT
Identification of VMS Issues	
Applications for VMS/HAR	What are the signs/radios used for?
Event/Scenario Matrix	What is the range of events that would require dissemination?
Detection	How is information used to generate messages?
Verification	What procedures/processes are required to verify the need for a message?
Action	How does the agency take action to display/broadcast a message?
Consistency and Coordination	MUTCD Style approach to VMS?
Audience	Who is the primary audience/customer?
Accurate/Timely/Credible	What measures are used to gauge these?
Coordination with Portable VMS	Different structures and installation techniques.
Sign Selection Guidelines	How to select one or more signs/transmitters for information dissemination?
Message Length Limitations	Permanent and portable signs, new installations.
Passive vs. Active Diversion Messages	self explanatory
Message Phasing Format	Sequential vs. scrolling vs. Discrete
Flashing Messages	self explanatory
Upper Case vs. Lower Case	self explanatory
Abbreviations and Roadway Identifiers	e.g., Boulevard vs. Blvd. Vs. Bl.
Graphics	Treatment of graphics and standradization
Text Justification	left, right, center
Character Spacing	Proportional spacing vs. fixed spacing
Message Updating	Detection/Verification/Action, frequency and opportunity
Numbered Streets	e.g., 22 nd vs Cermak Road
Message Redundancy	e.g., Arrows <i>and</i> "Next Left"
Identifying incident/congestion locations and limits	Location reference vs mile point
Indication of lanes blocked	How to describe?
Standard Terminology	"Beyond", "Traffic", "Congestion", etc.
Scheduled Event Descriptions	Stadium vs. Soldiers Field
Exit Designation	Numbers vs. Street names
Local Terminology/Identifiers	Hubbards Cave, Billy Mitchell, etc.
Collectors/Distributors	How to refer to these situations?
Highway Markers, Names and Route Numbers	e.g., I-55 vs. Symbols vs. Stevenson
Present Practice	Lessons learned from static sign practice and VMS

**Table 4-1: Preliminary List of Issues to be Addressed to Develop a Coordinated VMS/HAR Policy
(Cont.)**

Identification of HAR Issues	
Similarities and Differences with VMS	self explanatory
Message Focus	Scatter broadcast to wide-area or use short range customized messages?
Message Length and Load	How long should the message be and how much information can reasonably be disseminated?
Message Content	What information should be provided ?
Message Format	How should the message be structured, what should be said first, etc. in order to provide understandable information?
Message Presentation	self explanatory
Language	Should the messages be multi-lingual for everyday use or for special events?
Identification of Institutional Issues	
Integrated Systems Development	Should the policy address interagency access and use of VMS and HAR?
Legal Issues	What are the liability questions that need to be addressed?
Automation vs. Manual Control and Coordination	Should the policy address automated vs. manually controlled system and coordination between agencies?
Technology Policy	Should the selection of sign technology be standardized?
Communications Policy	Should the policy address communications and standard protocols?
Installation/Location (Spacing) Guidelines	Should the policy address standardization of design-related issues to meet long term goals and objectives?
Maintenance Policy	Should the policy address maintenance issues?

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APPENDIX
COORDINATED VMS AND HAR POLICY QUESTIONNAIRE